EPIDEMIOLOGIC AND MICROBIOLOGIC ASSOCIATIONS BETWEEN FLIES AND DIARRHEA

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Background and Aims: Diarrhea is the cause of death in almost 23% of Indian children under 5. Flies carry enteric pathogens and may mediate food-borne enteric infections. This study aims to characterize fly densities as a determinant of infectious diarrhea.
Methods: We recorded number and duration of diarrheal episodes for families of Vellore, India in an ongoing year-long cohort of 160 urban and 80 rural households with 1274 individuals (27% - under 5y.o.) accumulating 198795 person-days. Household questionnaires on living conditions were completed. ELISA, light microscopy, bacterial culture, and multiplex PCR were performed on stools. Fly abundance was measured in 2 seasons using fly ribbons placed in kitchens. PCR for enteric bacteria, viruses, and protozoan were performed on flies. Multivariate log-linear models were used to explore the relationships between diarrhea and fly densities, demographics, hygiene, and human/animal interactions.
Results: 91 (89% - in under 5s) episodes of diarrhea occurred from 8/6/2010 to 1/31/ 2011. Stool pathogens isolated in 24 of 77 (31%) of samples included *E.coli*, *Shigella* spp., *Vibrio* spp., *Giardia*, *Cryptosporidium spp.*, and Rotavirus. 43 of 60 (72%) fly samples were positive for pathogens including *E.coli*, *Salmonella* spp., Norovirus, and Rotavirus. Fly abundance was 2.56 times higher during the dry season compared to monsoon ($p<0.0001$). Trash disposal close to homes and rural living were significant risk factors for high fly densities. The adjusted relative risk (RR) of diarrhea associated with 75th percentile of fly density was 1.10[95%CI:1.03,1.19]. An increase in fly density to 75th percentile was associated with longer duration of diarrhea, RR 1.11[95%CI:1.05,1.18]. Indoor latrines were protective against high fly densities and diarrhea.
Conclusions: Flies harbored enteric pathogens including Norovirus, a poorly documented pathogen on flies. Fly densities were significant predictors for diarrhea. Both diarrhea and fly densities may exhibit seasonality to be confirmed with study completion.